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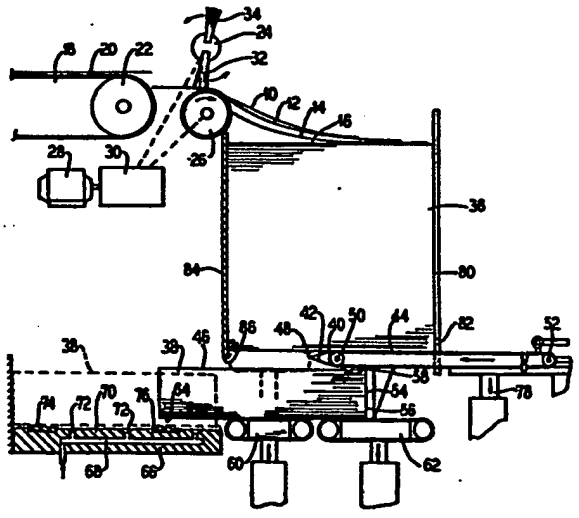
(54) Apparatus for slowing cut size sheets.

(57) A means for slowing cut sheets in seriatum flow by nipping the trailing edge of the sheets as they leave a high-speed conveyor system is provided whereby the sheets pass to a stacking pile at a slow speed. The nipping means is disclosed in several embodiments including a brush carrying roll (24) an oscillating roll on a lever arm and an air jet means. Ream removal means (40) are also provided to remove reams (38) of paper from the bottom of the stacking pile (36).



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The invention is directed to machinery for slowing down cut sheets of paper as they are fed to a stacking station and removal of reams from the stacking station and, more particularly, relates to a slowdown mechanism avoiding conventional overlap and in which more than one ream is collected in a pile prior to removal of the reams.

In the paper-cutting machinery field, it is common for cut sheets to be overlapped or shingled enroute to a stacking or collection station. A problem in high-speed sheeting is to be able to slowdown the sheet sufficiently enough, so as to not have lead edge damage. To do so one necessitates overlapping the sheets where, again, as one goes up in speed, a limit is reached when the overlap approaches 100% and the maximum overlap speed reaches 76.2-106.7 m/minHigh speed also causes a problem of air in the stacking pile and jog, making handling of the reams difficult and high quality hard to achieve.

The overlapping or shingling operation is usually performed by high and low-speed tape systems. The speed of the leading sheet is reduced as it is fed to the low-speed tape by some suitable means, such as a stop roll. One example of this stop roll shingling process is illustrated in U.S. Patent No. 3 554 534, where a snapdown roll is also disposed upstream of the stop roll to defect the tail ends of sheets passing into the low-speed tape down and out of the way of the next oncoming sheet being delivered by the high-speed tape system.

In this invention, the conventional overlap is eliminated. Instead of stopping the sheet with the lead edge, a tail-stopping device, consisting in a first embodiment of a top brush roll which knocks the tail down, allowing the next sheet to cross over and overlap. The brush roll contacts the sheet near the tail, forcing it down against a roll going 76.2-106.7 m/min. As the brush leaves the roll, there is nothing to drive the sheet into the stacking pile, so it sits on the roll until the brush comes around again, knocking the tail down of the next sheet. The brush then puts pressure on both

sheets. The bottom sheet is then accelerated to a 45.7-76.2 m/min. speed into the stacking pile, while the top sheet then sits on the unnipped, slow-speed roll waiting for the next nip.

In accordance with a second embodiment , a stationary air blow-down is positioned above a slow-speed rotating vacuum roll which catches the tail of the sheet. In a third embodiment, the tail of the sheet is forced down against the bottom roll by an oscillating spring-loaded nip wheel which is actuated by a signal which determines location of the sheet edge and gap in order to maintain its proper position on a trailing edge of the sheet.

With the second and third embodiments of the invention, the device includes a rubber-covered or high-frictioned bottom vacuum or plain nip roll which is turning at a speed of 76.2-106.7m/min. The fact that this roll is turning not only slows down the sheet when it is nipped against this roll, but also precludes the common problem of sheets hanging up in this area and not getting into the pile.

More than one ream is collected in this stacking, which accomplishes the compaction needed to compress all the air out of the pile. The reams are removed from the bottom of the pile by inserting a ream splitter spear type of device, whereby at a certain ream thickness, the spears (with a belt on them) are inserted into the pile. Attached to the spears is a pusher which will push the finished reams from two free-wheeling, lift-mounted conveyors onto an air table for conveying from the machine. In an alternate embodiment of the invention, the stacker and air table may be disposed at an incline.

Fig. 1 is a schematic side elevational view illustrating the slowdown device and ream removal device of the present invention.

Fig. 2 is a schematic side elevational view illustrating an alternative embodiment of the present invention.

Fig. 3 is a partial schematic side elevational

view illustrating a second embodiment of the slowdown device of the present invention.

Fig. 4 is a partial schematic side elevational view illustrating a third embodiment of the slowdown device of the present invention.

Fig. 5 is a partial schematic side elevational view illustrating a fourth embodiment of the slowdown device of the present invention.

With reference to Fig. 1, there is illustrated a series of sheets, such as paper sheets 10,12,14 and 16 which have been cut by a knife into individual sheets upstream of Fig. 1 and are being passed in a seriatim flow. A high-speed tape conveyor system 18 having a tape means 20 supported at one end by a roll 22 and at the other end by a similar roll not shown, serves to convey the cut sheets at high speed. The high-speed tape 20 conveys the sheets at speeds of up to 457.5m/min. per minute.

Immediately downstream of the turnaround roll 22, there is provided a slowdown device in accordance with the principles of the present invention. In the embodiment shown in Fig. 1, there is provided a tail-stopping device which comprises a top brush roll 24 and a slowly rotating roll 26. Both rolls 24 and 26 are operated by means of an electric motor 28 operating through appropriate gearing means 30.

The slow rotating roll 26 rotates with a surface speed of approximately 76.2-106.7m/minThe brush roll has two radially extending brush members 32,34 which are diametrically opposed on the roll 24. As sheets are fed by the conveyor system 18, the lead edge of the sheets passes between the two rolls 24, 26 when the brush members 32,34 are disposed approximately horizontally such that the lead edge can pass between the two rolls. As the sheet continues to pass between the two rolls, one of the brush members comes in contact with a portion of the sheet near the tail end and forces the sheet downwardly against the slowly rotating roll 26. As the brush member, which continues to rotate, leaves the roll 26, there is nothing to

drive the sheet into the stacking pile, so it sits there until the brush comes around again, knocking the tail down of the next sheet. As that occurs, the brush member puts pressure on both sheets. In Fig. 1 it is seen that the brush member 32 is knocking down the tail end of sheet 10 while sheet 12 is still engaged with the slowdown roll 26. With the brush member putting pressure on both sheets, the bottom sheet 12 is accelerated to a speed of approximately 45.7-76.2m/min. into the stacking pile as is shown by sheet 14. The top sheet 10 continues to sit on the unnipped-slow-speed roll 26, waiting for the next nip of the brush member. In this manner, delivery into the stacking pile at slow speed is accomplished.

More than one ream of paper sheets is collected in the stacking pile 36, which accomplishes the compaction needed to compress all of the air out of the pile. The reams are removed from the bottom of the pile as seen in Fig. 1 where a ream 38 is being removed. A ream splitter spear 40 having a sharp pointed leading edge 42 for original entry into the stacking pile 36 and having a belt 44 on the spear is inserted into the stacking pile 36. The pointed leading edge separates a top sheet 46 of the ream 38 from a bottom sheet 48 of the stacking pile 36. The belt 44 on the spear 40 is supported at one end by a front roller 50 and at a second end by a rear roller 52. As the spear is inserted into the stacking pile 36 separating the ream 38 from the rest of the pile, the belt 44 moves on the rolls 50,52 in a clockwise direction as viewed in Fig. 1 such that any portion of the belt 44 coming into contact with the bottom sheet 48 of the stacking pile 36 remains stationary with respect thereto until the spear is completely inserted into the stacking pile.

Depending downwardly from the spear 40 is a pusher plate 54 which engages a side-face 56 of the ream 38 and serves to move it laterally as the spear 40 is inserting into the stacking pile 36. The pusher plate 54 has a height at least slightly higher than the thickness of the ream 38 being separated in order to provide clearance as seen at 58 between the top sheet 46 of the removed ream 38

and the belt 44 which is moving around rollers 50 and 52.

The stacking pile 36 is normally supported by a lift table comprising two free wheeling conveyors 60,62 which engage a bottom sheet 64 of the bottom ream in the stacking pile 36. The two conveyors 60,62 comprise a split lift table which allows the reams to be supported while the spear 40 is being inserted and withdrawn. The two conveyors 60,62 are mounted for independent vertical movement such that the ream and stacking pile 36 are continuously supported as required.

As the spear is inserted into the stacking pile 36 the pusher plate 54 moves the ream 38 which is supported on the free-wheeling conveyors 60,62 toward an air table 66. When the ream 38 is deposited on the air table 66 as is shown in phantom, most of the weight of the paper is supported by an air cushion from air supplied under pressure through conduits 68 in the air table which are exposed to a top surface 70 of the table through individual air ports 72. Longitudinal conveyor belts 74,76 which extend above the surface 70 of the air table 66 are used to move the individual reams to the next station in the paper processing system.

As the spear is retracted from the stacking pile 36, the smaller free-wheeling conveyor 60 moves vertically to support the bottom of the stacking pile while the spear continues to be withdrawn. As soon as the spear is withdrawn, the second conveyor 62 moves vertically to also support the stacking pile.

It is desired that the top sheet, represented by sheet 16 in Fig. 1, of the stacking pile remain at the same level relative to the rolls 26,24 throughout the entire stacking operation. Therefore,the spear 40, as well as the free-wheeling rollers 60,62 is mounted for vertical movement on a shaft 78. Also, as seen in Fig. 1, a housing 80 for the stacking pile 36 has a portion cut away at 82 corresponding to the entry point of the spear 40 such that the spear is able to engage the stacking pile 36 while the pile is still held within the housing 80 and

as the spear moves into the stacking pile 36 it will also move downwardly due to the additional sheets being stacked on the pile such that when it reaches an opposite wall 84 of the housing 80 it will pass beneath a lower edge 86 of that wall.

In Fig.2 there shown an alternative embodiment of the ream separating arrangement in which the stacking pile 36a, the spear mechanism 40a, the free-wheeling conveyor 60a and 62a and the air table 66a are all inclined to the same degree which allows for an enhancement of the stacking and separating procedure. The air table 66a has a side conveyor belt 88 associated therewith driven by motor 90 which moves the separated reams 38a to the next processing station as opposed to the bottom conveyor belt 74 and 76 of the embodiment shown in Fig. 1. In all other respects, the operation of this embodiment is the same as that shown in Fig. 1, this embodiment merely utilizes the force of gravity in assisting in the alignment of the stacking pile 36a and in the removal of the separated reams 38a.

Fig. 2 does show the brush roller 24 in a different rotational position than that shown in Fig. 1 and it is seen that a sheet of paper 92 is being passed between the rollers 24,26 by means of the high-speed tape mechanism 18. It is also seen that brush member 34 will contact the tail end of sheet 92 causing it to drop down against roll 26 where the pressure of the brush member 34 will cause the sheet 10 lying on the roll 26 to accelerate and move into the stacking pile 36a.

Fig. 3 shows an alternative embodiment of the tail stopping and knockdown device of the present invention where it is seen that individual sheets 110,112 ,114 and 116 are fed into a stacking pile 118 by means of two high-speed tapes 120, 122 which convey the sheets at speed up to 457.5m/min. The lower tape means 120 is supported at one end by roll 124 and at an opposite end by a similar roll not shown and the upper tape means 122 is supported by rolls 126,128 and by additional rolls not shown. The upper tape 122 extends further rightward in Fig. 3 of the

turnaround roll 124 of the bottom tape 120.

Downstream of the turnaround roll 124, there is provided an alternative embodiment of the slowdown device of the present invention. In the embodiment shown in Fig. 3 there is provided a tail-stopping device which comprises slowly rotating vacuum roll 130 and a blow down device indicated generally at 132. The vacuum roll 130 is rotated by means of an electric motor 136. A blower shown schematically at 138 is used to evacuate the vacuum roll 130 and to pressurize the hollow interior of an air nozzle 134.

The vacuum roll 130 has a series of openings 140 therethrough and is generally hollow, the blower 138 being arranged to evacuate the hollow interior thereby causing air to be drawn radially inwardly in the openings 140. Because of the large number openings 140 in the roll 130, the suction pressure at any one given opening 140 is relatively low.

The blow down device 132 comprises a generally cylindrical rotating housing 142, disposed horizontally, which has a longitudinal slot 144 extending along its length which is disposed at the lowest portion of the housing 142. The housing 142 surrounds the nozzle 134 which comprises a generally hollow member having an elongated nozzle element 146 which has a central passageway 148 extending radially outwardly in the nozzle member. The housing 142 is drivingly rotated by the motor 136 about its horizontal axis such that the nozzle passage 148 will align with the slot opening 144 in the housing 142 once during each revolution of the housing 142.

The rotating housing 142 is in turn enclosed within an air box 150 which has a slot 152 therein which can align with the rotating slot 144 of the rotating housing 142. Once during each revolution of the housing 142 the slots 144 and 152 will align and an air blast will exit downwardly between the tape means 122 and against a tail end of a sheet of paper, thereby forcing the sheet against the slowdown roll 130. As the rotating housing 142 rotates, it shuts off the air to slot 152 as the lead edge of the next sheet of paper passes through that position.

A second, horizontally disposed slot 154 is provided in the air box 150 upstream of the first slot 152 which directs air in the direction of the movement and which causes a venturi action between the paper and the air box 150, thereby holding the lead edge of the paper against the top tapes 122. In this manner, the lead edge of the following sheet is lifted over the trailing edge of the preseeding sheet which is overlying the stacking pile 118.

Fig. 4 shows an alternative embodiment of the tail stopping and knockdown device of the present invention where it is seen that individual sheets 160,162 and 164 are fed into a stacking pile 166 by means of a high-speed tape means 168 which conveys the sheets at speeds up to 457.5 m/min. Tape means 168 is supported at one end by turnaround roll 170 and at an opposite end by a similar roll not shown.

Immediately downstream of the turnaround roll 170, there is provided a second alternate embodiment of a slowdown device constructed in accordance with the principals of the present invention. In the embodiment shown in Fig. 4 there is provided a tail-stopping device which comprises an oscilating spring-loaded nip wheel 172 which is actuated accurately by a signal which determines the location of the sheet edge and gap in order to maintain its proper position on the trailing edge of the sheet.

The nip wheel 172 is rotatingly carried on the end of an arm 174 which pivots about a fixed point 176. The arm 174 is continuously biased downwardly by spring means 178 and it is selectively urged upwardly by actuating means 180 such as a retracting piston.

A sheet location sensing means 182 is shown in Fig. 4 in the form of an optical sensor having a light emitting or reflecting means 184 which causes light to be directed at the sensor 182 during the gap between succeeding sheets of paper. The sensor 182 is connected to a control means 186 which controls a valve means 188 connected to the piston 180. At appropriate times the piston 180 is caused to be retracted thereby lifting the nip wheel 172 to the position shown in phantom at 190. This allows the sheet to travel past the nip wheel. Just prior to the tail of the

sheet passing the nip wheel 172, the control means 186 causes the lifting means 180 release and the bias of the spring 178 causes the nip wheel 172 to move downwardly to press the tail of the sheet against a slowly rotating roll 192. In this manner, the sheet is slowed and is caused to drop into the stacking pile 166.

The slowly rotating roll 192 is rotated by a motor means 194 and it can be of a vacuum roll type with an interior evacuated by a blower means 196 and having a plurality of spaced openings 198 therethrough. An outer surface 200 of the roll 192 is rubber-covered or is of a high-frictioned material which assists the vacuum roll in gripping the sheets.

Fig. 5 shows an alternative embodiment of the tail-stopping device shown in Fig. 1 which includes a plate 202 dispose immediately downstream of the turnaround roll 22 and just upstream of a slowly rotating roll 26a which is shown to be a vacuum roll. In this embodiment, each sheet is slowed down and passed to the stacking pile 36 individually and immediately rather than sitting on the unnipped-slow-speed roll 26 of Fig. 1, waiting for the next nip of the brush member 32.

As it appears from the foregoing specification, the invention is susceptible of being embodied with various alterations and modifications which may differ particularly from those that have been described in the preceding specification and description. It should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

CLAIMS:

1. An apparatus for slowing cut size sheets in seriation flow comprising:

A high-speed tape conveyor system, said conveyor system having a delivery end and having a sheet carrying surface, a collection zone, and a slowdown assembly positioned downstream from said conveyor system delivery end and upstream of said collection zone comprising a slowdown roll means driven by a motor means to rotate at a slower speed than said conveyor system, and a nip means for forming a nip with said slowdown roll means through which sheets pass to said collection zone, said nip means having means to selectively press each sheet into driving engagement with said slowdown roll means for slowing so that the trailing edge of each sheet is nipped and the leading edge of each sheet passes unhindered between said roll means and said nip wheel means.

2. The apparatus of claim 1 wherein said high-speed tape conveyor travels in the range of 122 to 457.5 m/min.

3. The apparatus of claim 2 wherein said slowdown roll means rotates at a surface speed in the range of 76.2-106.7 m/min.

4. The apparatus of claim 1 wherein said slowdown roll assembly has a tape surface disposed at a level below said sheet carrying surface of said conveyor system.

5. The apparatus of claim 4 wherein said nip means is positioned above said slowdown roll means.

6. The apparatus of claim 1 whereby said nip means comprises a rotating brush roll spaced from said roll means and having at least one brush means extending radially therefrom of a length sufficient to reach said roll means.

7. The apparatus of claim 6 wherein said brush roll and said slowdown roll means rotate in opposite directions.

8. The apparatus of claim 1 wherein said nip means includes an air means through which a flow of air is selectively directed toward said slowdown roll means to press said sheets into engagement with said slowdown roll

means.

9. The apparatus of claim 8 wherein said nip means includes a rotating air control surrounding said air nozzle means through a slot therein for controlling the direction of air flow from said nozzle means.

10. The apparatus of claim 9 wherein said nip means further includes an air chamber means surrounding said air control means having a first slot means between said air control means and said slowdown roll means.

11. The apparatus of claim 10 wherein said high-speed tape conveyor system include a first tape means supported on a turnaround roll means positioned uptstream of said slowdown roll means and a second tape means supported on a turnaround roll means.

12. The apparatus of claim 11 wherein said air chamber means further includes a second slot opening for directing a flow of air in the direction of movement of said cut sheets for providing a venturi action to hold said sheets against said second conveyor tape means.

13. The apparatus of claim 1 wherein said nip means comprises a roll means mounted on an oscillating link, said roll means being movable toward and away from said slowdown roll means.

14. The apparatus of claim 13 wherein said nip means includes sensing means to detect the lead edge of said sheets and the gap between succeeding sheets.

15. The apparatus of claim 14 wherein said roll means is moved away from said slowdown wheel means in response to said sensing means and prior to each leading edge of said sheets passing between said roll means and said slowdown roll means.

16. The apparatus of claim 15 wherein said sensing means is positioned upstream of said slowdown roll means.

17. The apparatus of claim 1 further including a support plate means positioned between said delivery end of said conveyor system and said slowdown roll means.

18. The apparatus of claim 1 wherein said slowdown roll means includes an unnipped rotating roll.

19. The apparatus of claim 1 wherein said slowdown

roll means includes a vacuum rotating roll comprising a generally hollow roll having an interior being continuously evacuated and a plurality of openings therethrough for drawing air into said interior.

20. The apparatus of claim 19 wherein an outer surface of said roll has a high surface friction.

21. The apparatus of claim 19 wherein said outer surface is covered with a soft rubber material.

22. The apparatus of claim 1 wherein said collection zone comprises a substantially vertical stacking pile defined between an upstream wall and a downstream wall.

23. The apparatus of claim 22 wherein said walls are disposed substantially vertical.

24. The apparatus of claim 22 wherein said walls are disposed at an angle to vertical wherein the bottoms of said walls are farther upstream than the top of said walls.

25. The apparatus of claim 22 including a ream removing means for automatically and continually removing reams of said sheets from the bottom of said stacking pile.

26. The apparatus of claim 25 wherein said ream removing means comprises a spear means for separating reams from said stacking pile, a pusher means associated with said spear means for pushing said separated ream away from said stacking pile, movable support means for supporting the bottom of said stacking pile and conveyor means for moving said removed ream to a distant point.

27. The apparatus of claim 26 wherein said spear means includes a free rotating belt means for engagement with a bottom sheet on said stacking pile above said removed ream.

28. The apparatus of claim 26 wherein said pusher means comprises a plate depending downwardly from said spear means.

29. The apparatus of claim 26 wherein said movable support means comprises a plurality of free rolling conveyors independently movable toward said stacking pile for support thereof and away from said stacking pile during removal of said reams and for clearance with said pusher means.

30. The apparatus of claim 26 wherein said conveyor

means comprises a table member for supporting said removed ream and moving belt means for engaging said ream and moving it to said distant point.

31. The apparatus of claim 30 wherein said table member comprises an air table having air jets supporting a portion of the weight of said ream.

32. The apparatus of claim 30 wherein said table has a substantially horizontal surface and said moving belt means is substantially parallel with said surface.

33. The apparatus of claim 30 wherein said table has a surface disposed at an angle to horizontal and said moving belt means is substantially perpendicular to said surface.

34. The apparatus of claim 26 wherein said spear means, said pusher means and said movable support means are each vertically movable such that a top sheet on said stacking pile is kept substantially at the same level throughout the stacking operation.

35. An apparatus for slowing cut size sheets passing in seriatum flow between a high-speed tape conveyor system having a carrying surface and a collection zone, comprising :

a slowdown assembly having an upper nip means and a lower slowdown roll means defining therebetween a nip for receiving sheets therethrough passing from said conveyor system to said collection zone,

said lower slowdown roll means being driven by a motor means to run at a speed less than the speed of said high-speed tape conveyor,

said upper nip means having means to selectively nip a trailing edge of each sheet against said lower roll means for retarding the speed of said sheet as it passes to said collection zone.

36. The apparatus of claim 35 wherein said high-speed tape conveyor travels at about 122 to 457,5 m/min per minute.

37. The apparatus of claim 36 wherein said slowdown roll means rotates at a surface speed of about 76-107 m/min per minute.

38. The apparatus of claim 35 whereby said nip means comprises a rotating brush roll spaced from said roll means

and having at least one brush means extending radially therefrom of a length sufficient to reach said roll means.

39. The apparatus of claim 38 wherein said brush roll and said slowdown means rotate in opposite directions.

40. The apparatus of claim 35 wherein said nip means includes an air nozzle means through which a flow of air is selectively directed toward said slowdown roll means to press said sheets into engagement with said slowdown roll means.

41. The apparatus of claim 40 wherein said nip means includes a rotating air control means surrounding said air nozzle means through a slot therein for controlling the direction of air flow from said nozzle means.

42. The apparatus of claim 41 wherein said nip means further includes an air chamber means surrounding said air control means having a first slot means between said air control means and said slowdown roll means.

43. The apparatus of claim 42 wherein said high-speed type conveyor system includes a first tape means supported on a turn-around roll means positioned upstream of said sllowdown roll means and a second tape means supported on a turnaround roll means positioned downstream of said slowdown roll means, said air chamber means further including a second slot opening for directing a flow of air in the direction of movement of said cut sheets for providing a venturi action to hold said sheets against said second conveyor tape means.

44. The apparatus of claim 35 wherein said nip means comprises a roll means mounted on an oscillating link, said roll means being movable toward and away from said slowdown roll means.

45. The apparatus of claim 44 wherein said nip means includes sensing means to detect the lead edge of said sheets and the gap between succeeding sheets.

46. The apparatus of claim 45 wherein said roll means is moved away from said slowdown wheel means in response to said sensing means and prior to each leading edge of said sheets passing between said roll means and said slowdown roll means.

47. The apparatus of claim 46 wherein said sensing means is positioned upstream of said slowdown roll means.

48. The apparatus of claim 35 further including a support plate means positioned between said delivery end of said conveyor system and said slowdown roll means.

49. The apparatus of claim 35 wherein said slowdown roll means includes an unnipped rotating roll.

50. The apparatus of claim 35 wherein said slowdown roll means includes a vacuum rotating roll comprising a generally hollow roll having an interior being continuously evacuated and a plurality of openings therethrough for drawing air into said interior.

51. The apparatus of claim 50 wherein an outer surface of said roll has a high surface friction.

52. The apparatus of claim 50 wherein said outer surface is covered with a soft rubber material.

53. A method for slowing cut-size sheets passing in seriatum flow from a relatively high-speed conveyor system having a carrying surface to a collection zone , comprising:

dropping sheets off a delivery end of said high-speed tape conveyor system such that the leading edge of each sheet extends horizontally outward,

delaying each sheet downstream of the delivery end by passing each sheet through a slowdown nip forced by upper nip means and lower slow-speed roll means such that the trailing edge of each sheet is nipped and the leading edge of each sheet passes unhindered,

directing each sheet through said slowdown nip at a speed not greater than said slow-speed roll means such that each sheet passes individually to said collection zone at a slow speed.

54. The method of claim 53, further comprising : driving said slow-speed roll means in continuous rotation, and selectively intermittently causing said upper nip means to nip each sheet in driving engagement with said lower roll means.

55. The method of claim 54, further comprising: controlling the nipping of said upper nip means so as to grasp each sheet in its trailing third portion.

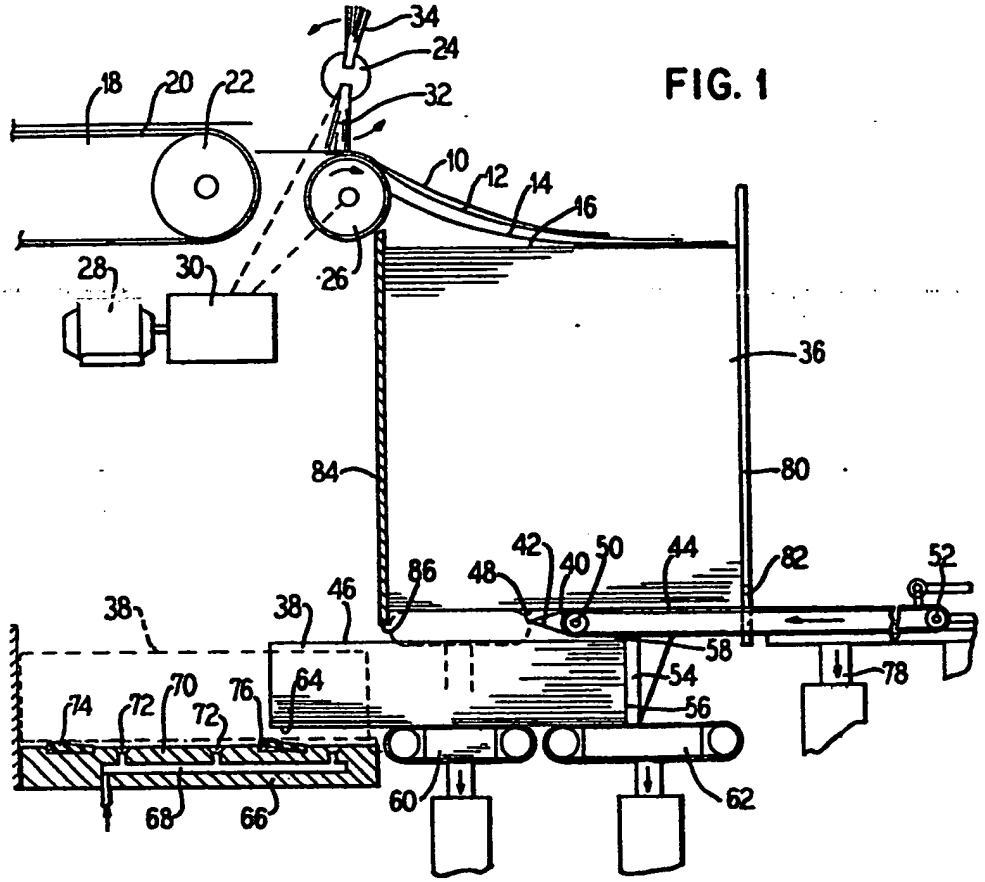
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FIG. 1

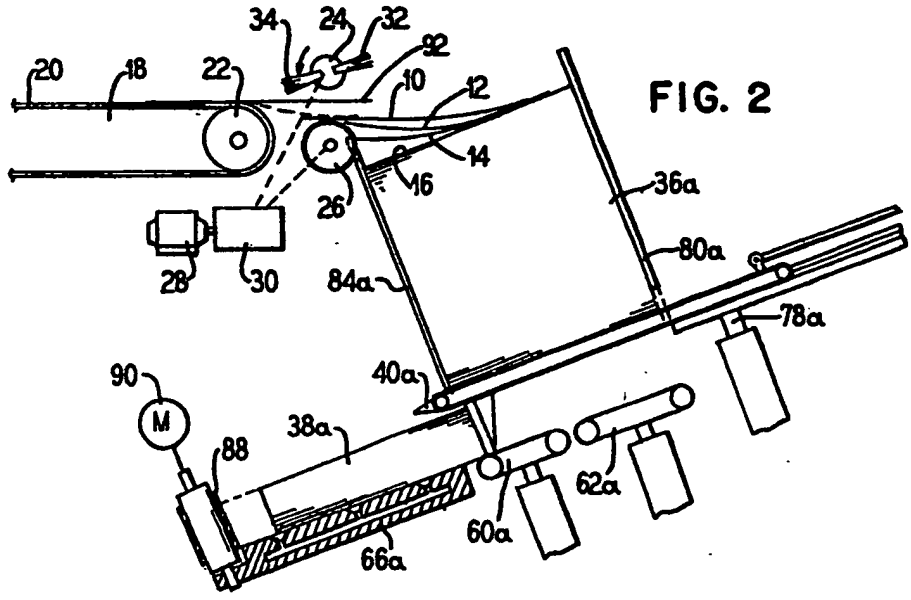
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FIG. 2

FIG. 3

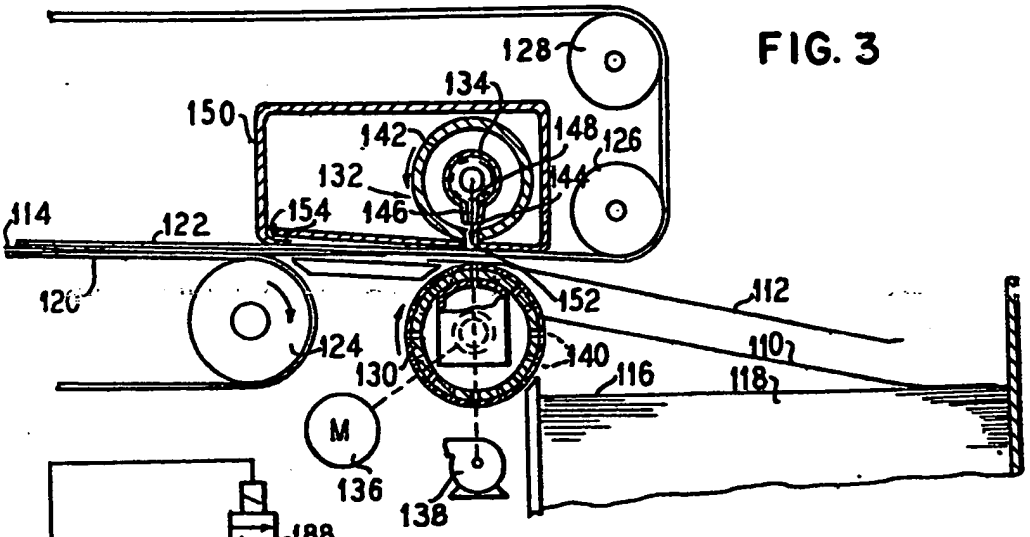


FIG. 4

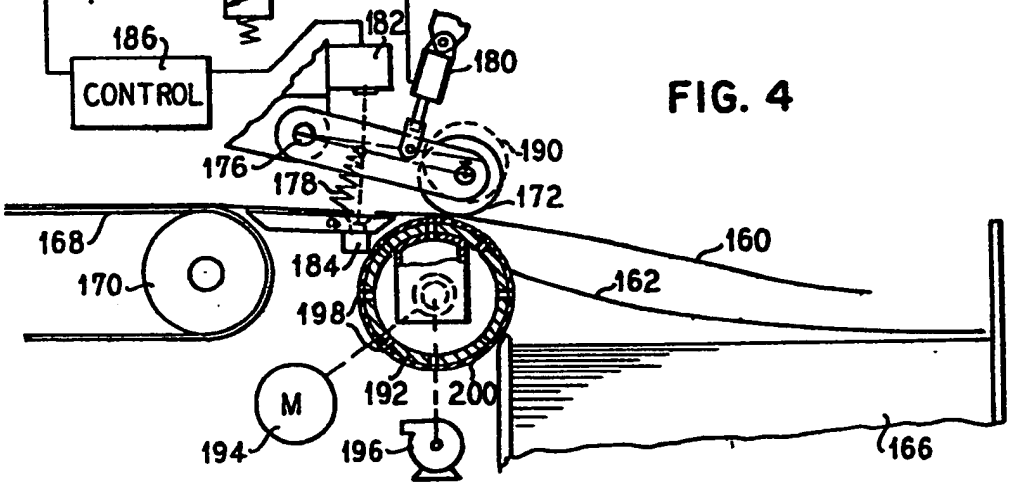
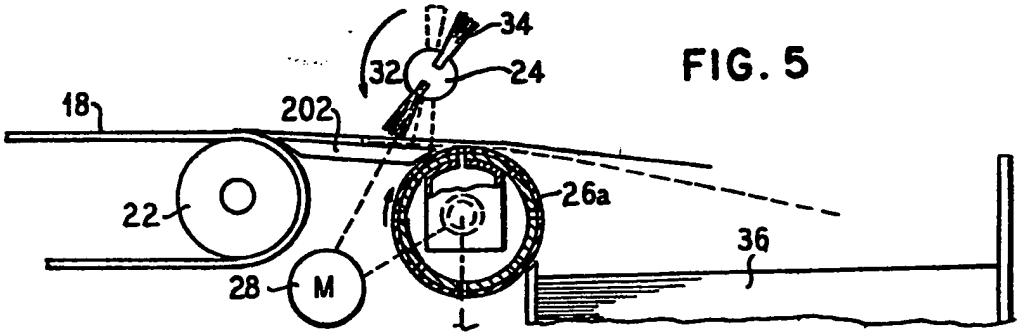


FIG. 5



European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 84630174.5

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 4 272 069 (MATTHEWS) * Fig. 3-8; page 1, line 53 - page 2, line 5; page 3, lines 34-43 *	1,4,5, 13-17, 35,44-48,53-55	B 65 H 29/68 B 65 H 29/22 B 65 H 31/10
X	DE - B2 - 1 561 728 (MASSON SCOTT) * Fig.1, 2A-2C; claim 1; page 4, lines 15-20; page 5, lines 20-28 *	1,4,5, 13-17, 35,44-48,53-55	
Y		8,18, 19,22, 23,40, 49,50	
Y	DE - B2 - 2 025 015 (DR. OTTO C. STRECKER KG) * Fig. 1; page 1, lines 57-67 *	18,49	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 65 H
Y	DE - A1 - 2 523 430 (VITS) * Fig. 2; claim 1; page 6, lines 6-10 *	19,50	
Y	DE - B - 1 245 702 (JAGENBERG) * Fig. 1-4; claim 1 *	8,40	
Y	US - A - 3 630 517 (ENSKAT) * Fig. 1-2; abstract *	22,23	
A		25,30, 32	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	26-02-1985	SÜNDERMANN

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DOCUMENTS CONSIDERED TO BE RELEVANT

EP 84630174.5

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE - A1 - 2 622 781 MOHR) * Fig.; page 8 *	26,27	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

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